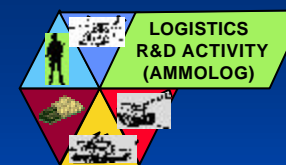


**USA TACOM-ARDEC  
LOGISTICS R&D ACTIVITY  
(AMMOLOG)**

**MUNITIONS LOGISTICS  
TECHNOLOGIES UPDATE**

**2ND ANNUAL  
MISSILES & ROCKETS SYMPOSIUM  
SAN ANTONIO / 16 MAY 01**



# Munitions Logistics Technologies Update

—  
USA TACOM-ARDEC  
Logistics R&D Activity  
(AMMOLOG)  
Picatinny Arsenal, NJ

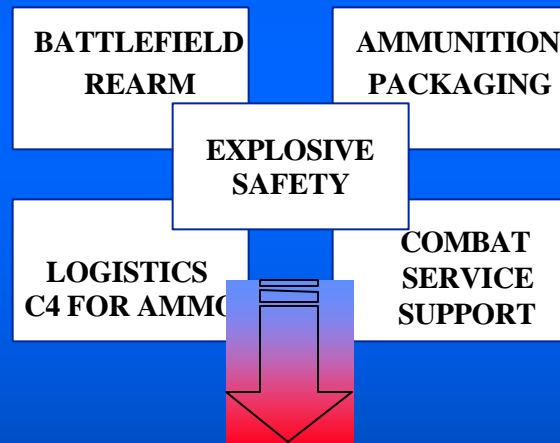
**GREGG PETERS**  
AMCOM Field Office  
DSN 746-3686, (256) 876-3686

Tank-automotive & Armaments COMmand

# Our Mission and Thrust Areas

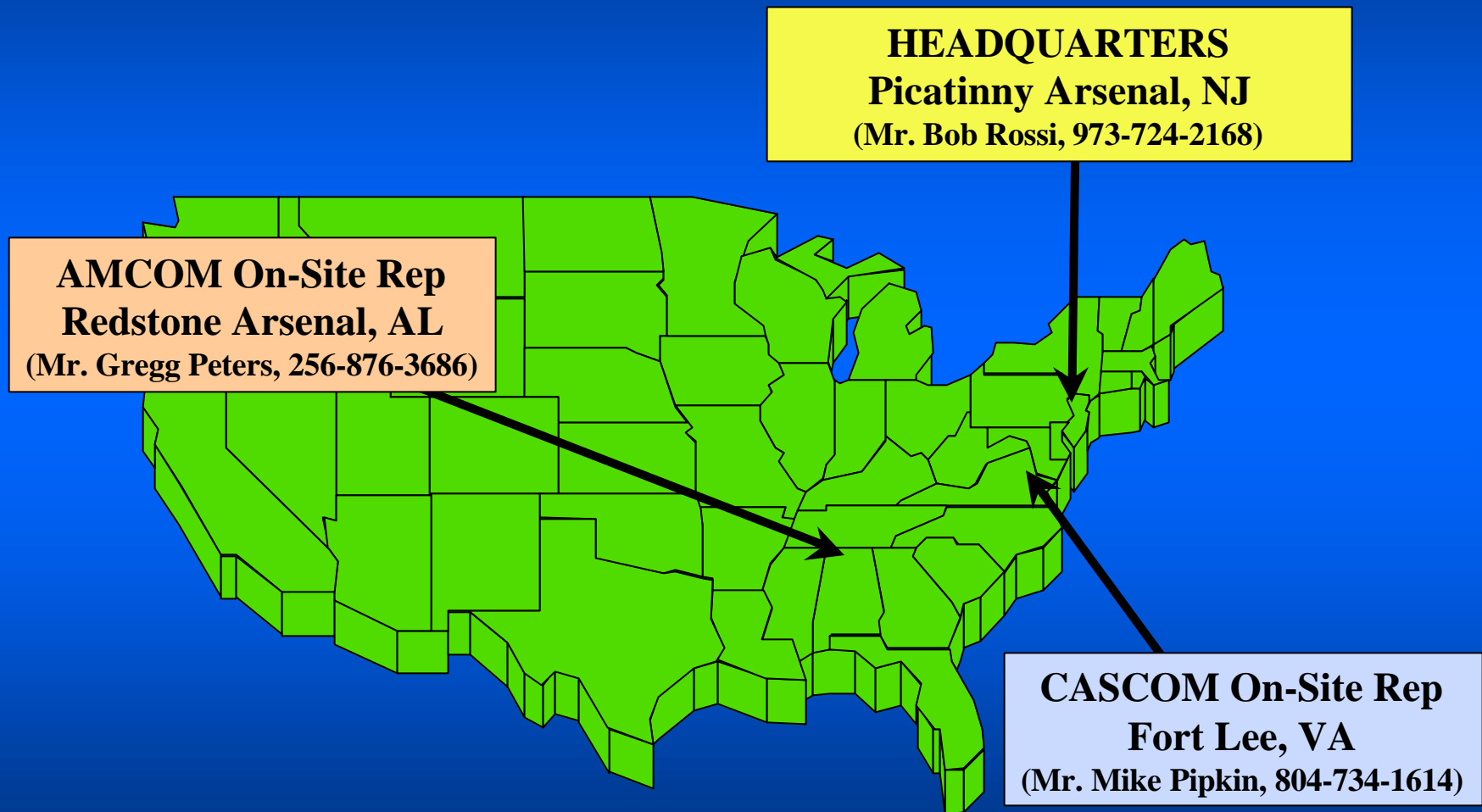
**MISSION:** Develop new technologies to improve the ammunition logistics system and reduce logistics support requirements of future armament systems

## THRUST AREAS



- Reduce weapon system rearm times
- Apply state-of-the-art technologies to improve ammunition packaging
- Enhance explosives safety
  - Manage Army Insensitive Munitions Program
- Improve Logistics C<sup>4</sup> Information for Ammo
- Improve strategic and battlefield distribution
  - Manage the Army's implementation of Strategic and Mission Configured Loads

# Log R&D Activity Operations



# Examples of Our Impact on the Army

## Battlefield Rearm



Artillery Rearm Module (ARM) II  
Technology Transitioned  
to CRUSADER

## Explosives Safety



Ammo in MILVANs TDP  
Used in Bosnia and Haiti  
1200 ft → 360 ft Hazard Zone

## Ammunition Packaging



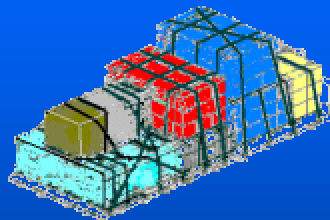
M1A1 Tank Ammo Packaging  
Reload 33 → 13 Min

## Logistics C4 for Ammo



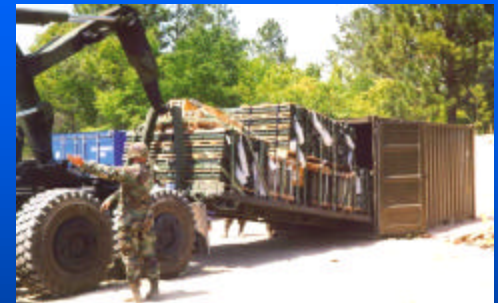
Ammunition Surveillance  
Information System (ASIS)  
Over 2300 Fielded Worldwide

## Logistics Analysis



Strategic Configured Load  
(SCL) Feasibility Study  
May influence future ammo  
distribution

## Combat Service Support



PLS Enhancements - M1 flatrack,  
Container Handling Unit & CROP  
Fielded Worldwide

# REMOTE READINESS ASSET PROGNOSTICS/DIAGNOSTICS SYSTEM (RRAPDS)

Joint TACOM-ARDEC & AMRDEC Science & Technology Objective (STO)

## Description

Develop/integrate micro-electronic environmental sensor technologies and wireless data communications to measure temperature, barometric pressure, humidity, and extreme shock events throughout munitions' lifecycle to enable remote assessment of their "health" and readiness status



## Benefits

- Enables near real-time missile and ammunition diagnostics and prognostics
- Reduces logistics tail and cuts O&S costs
- Alerts a combat commander to an impending munitions failure
- Prevents the unnecessary degradation of critical assets
- Greater surveillance efficiency

## Technologies

- Microchip radio frequency transceiver for close range wireless communications
- Integrated micro sensor suite for environmental data capture and history log
- On-board power management system to ensure long life (10+ years)
- Data collection via the Ammo Surveillance Info System and tie in to the Munitions History Program; SDS, SAAS, and CSSCS



# Remote Readiness Asset Prognostic/Diagnostic System

A Joint AMCOM-AMRDEC, TAGCOM-ARDEC Science & Technology Objective (STO)

Command Level Readiness  
& Eng'g Assessments

Data Collection  
Ammunition Surveillance Information  
System – Munitions History Program

Internet

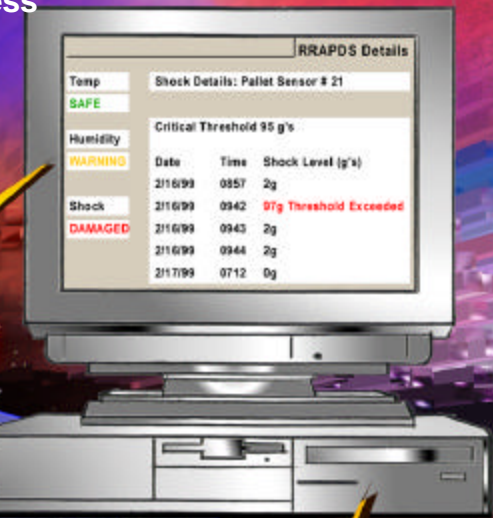
OSC

## BENEFITS:

- Helps achieve “ultra-reliability”
- Reduces logistics burden by ensuring transportation resources are not used to deliver “bad” munitions
- Ensures war fighter only receives good munitions

## Applications:

- FCS Munitions
- 2.75” Rockets
- 120 mm Tank Ammo
- Mortar Systems
- Propellant - e.g. MACS
- Missiles – e.g. PAC 3



*Committed to Excellence*

# FCS Multi-Role Armament System - Logistics

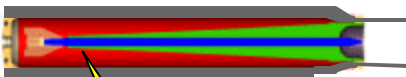
## Multi-Role ETC Armament System for FCS STO

### Description

Demonstrate a “plug-in” modular packaging and weapon rearm solution that is integrated with the ammo, autoloader, and armament system to automate and speed FCS rearm



### Multi-Role Cased Telescoped Ammunition



RF ID & Propellant Temperature

### Benefits

- Completely automated “plug-in” weapon system rearm
- 2.5X faster rearm
- 2X manpower multiplication
- Speeds rearm under NBC conditions
- Provides instant temperature and logistics data to optimize ETC gun performance and increase lethality
- Automatic Inventory Control
- Provides Total Asset Visibility (TAV) for Just In Time Resupply

### Technologies

- Modular ammo packaging concepts
- Robotic ammo handling system
- Advanced composite materials
- Micro-electronic sensors





# Ammo Provider Program

**Objective:** To protect critical munitions supplies through improved ammo distribution velocity and ammo storage area survivability



*Munitions Survivability  
Software*



*Munitions Survivability  
Hardware*



*Automated Robotic Materials  
Handling Equipment*



*Palletized Loading System (PLS) Shoe*

**Logistical Force  
Protection for  
Critical Munitions**

**An AMMOLOG System that:**

- is more survivable
- has reduced footprint
- is distribution based

**Leverages a  
reduced ammo  
force structure**

# Munitions Survivability Software

## Description

Develop an expert computer software system which will take a list of ammo to be stored and recommend storage layouts for maximum survivability and efficiency during military operations.

**Expert Software to Balance  
Mission Requirements vs Regulations**



**Recommends layout and mitigation  
techniques for maximum survivability**

## Features

- Provides a 3-D display of the ammo supply area with overlays of unique geography features, structures, and safety protocols
- Includes 'helper' modules (MHE calculator, SOP aid)
- Provides recommendations to mitigate the risk areas that are determined

## Progress

- Contract awarded to LESCO.
- Prototype software demo'd March 01 w/321 Ord Bn
- Uses std DOD QD/NEW software module
- Conducting bi-monthly IPRs with CASCOM, USADAC, and others.
- Very positive feedback from user community
- Transition planning w/STAMIS on-going
- MSS II planning in progress

**Decision Aid for Smart Ammo Storage Planning**

# Munitions Survivability Hardware

## Description

Barricades and Fire Blocking Blankets to prevent explosive propagation and permit ammo stacks to be stored closer together

## Use

- Applies to ammo storage areas (all Army munitions). Especially suited to peace-keeping and contingency operations (i.e. Task Force Falcon) where minimal logistics footprint is required.

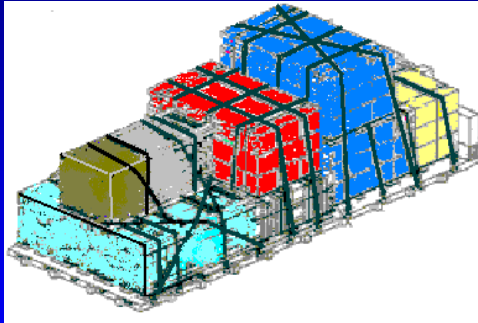
## Benefits

- Reduces separation distance between barricaded ammo stacks (8800 lbs Net Explosive Weight) from 40 feet to 28 feet (30% reduction)
- Provides asset preservation – not just explosives safety
- Reduces risk to enemy or terrorist attack of critical munitions supplies
- Barricade is quickly built, inexpensive, and long lasting





# Strategic and Mission Configured Loads



**Ammo loads tailored for a specific weapons system**

## **Strategic Configured Load (SCL)**

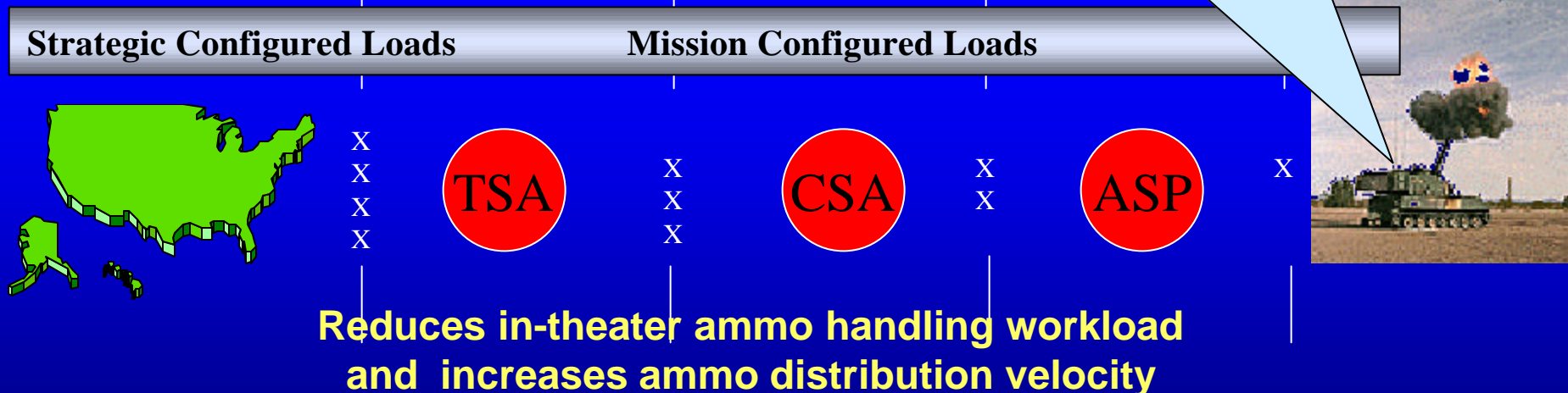
- Configured outside theater

## **Mission Configured Load (MCL)**

- In-theater configuration of single DODIC shipments and minimal reconfiguration of SCLs to meet evolving operational requirements

### **Field Artillery SCL Example**

- Propellant Charge
- Projectile 155mm HE
- Fuze
- Primer



**Conducted SCL/MCL Army Studies Program for Army DCSLOG to determine how to get there**

# CASCOM Configured Load Unit Build (CLUB) Concept Experimentation Program (CEP) Ft Bragg May 99



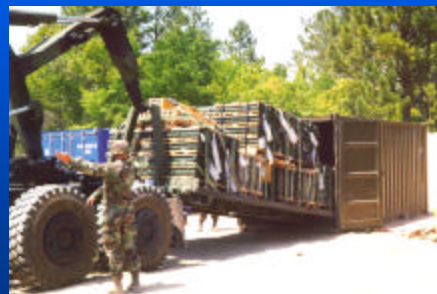
Single Ammo Type -  
Containerized



Single Ammo Type  
on CROP



Breakbulk - Single  
Ammo Type



Strategic Configured  
Load on CROP

Average = 108 minutes  
(with 5 soldier team)



Mission Configured Load on CROP  
100% Correct Mix

WARREQ 05 Rates  
Require 37,000  
Loads

# Materials Handling Equipment Assessment

## Follow-on to CASCOT FY99 CLUB CEP

*Rapid warfighter  
focused ammo  
resupply*

Smart Crane for Application  
to PLS or HEMMT LHS



Intelligent Forklift



*Objective: Early-on assessment of the potential of automation  
to reduce time to prepare mission configured loads*

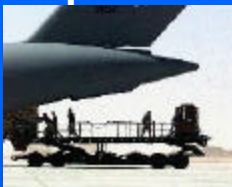
# Palletized Loading system Shoe/Slipper Improved Delivery of Munitions by Air

## Problem:

The Army does not move cargo from ground to air to ground as quickly as it would like because the Army distribution platform (PLS Flatrack CROP) is not designed to travel in an USAF aircraft

## *Current System*

Unload the  
airplane



Move K-loader  
From airplane



Unload the  
K-loader



Load the  
PLS truck



Drive to the  
firing point



Load the  
truck



Drive to the  
ammo area





# Improved Delivery of Munitions by Air

## *PLS Shoe/Slipper*

Combat Offload or  
PLS Truck Unload



PLS Pick up



Drive to the  
firing point

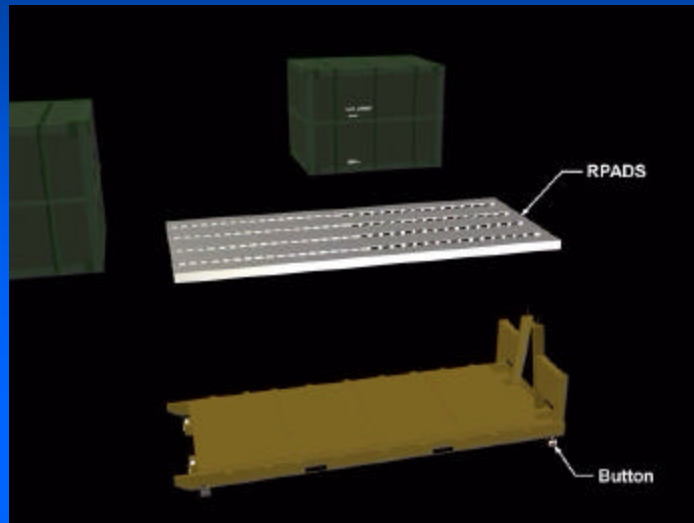


*Adapters to make CROPs compatible with USAF cargo aircraft*

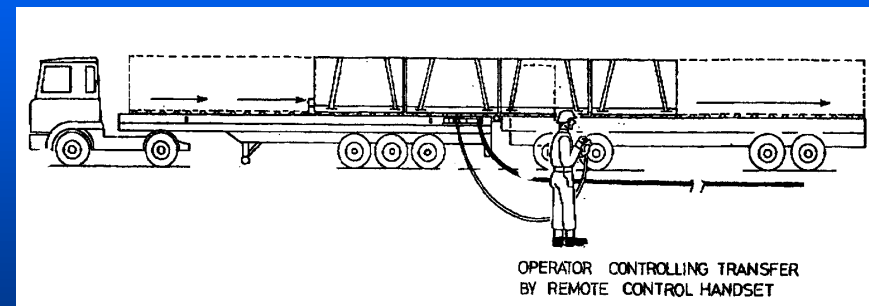
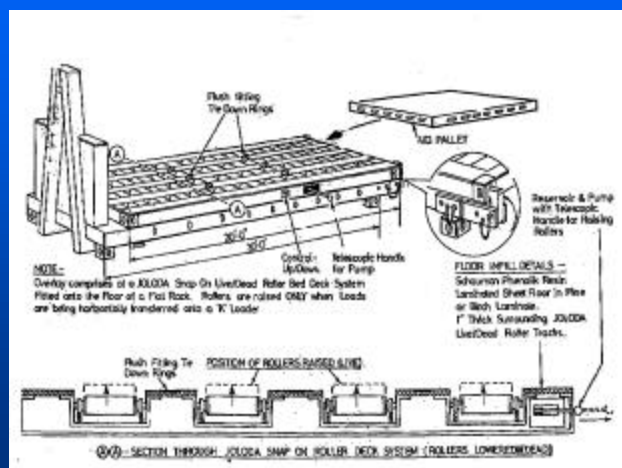


*Theater Payoff* *Potential for fewer C17 sortie equivalents, improved soldier productivity, and faster ammo delivery from APOD to the gun*

# Roller Platform for Air Delivery (RPAD)



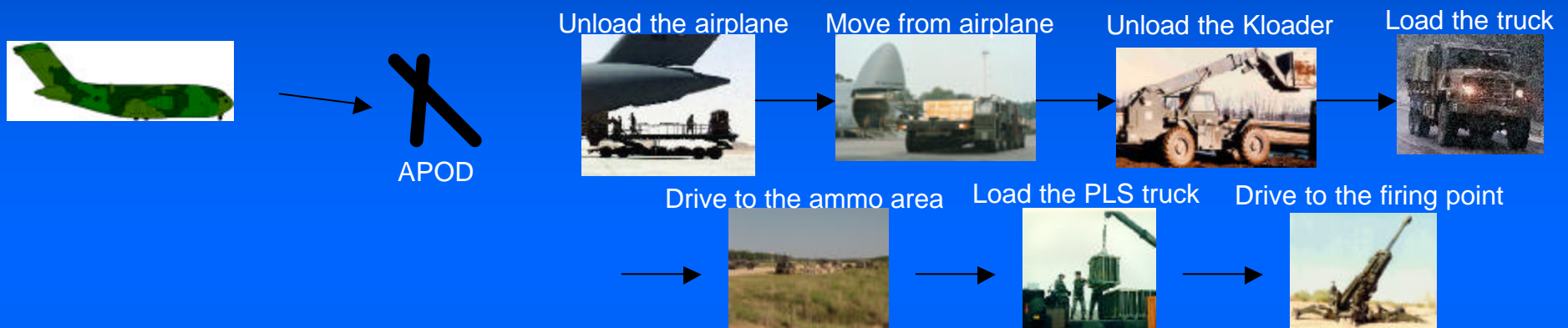
*Speeds delivery of ammo on USAF 463L pallets*



# Enhanced Delivery System – Air

Project Objective: Design & test a platform and a truck modification that works with an airplane

Current System    37 C17 Sorties    2.3 ST/Person/Hour    147 hours \*



EDS-A    23 C17 Sorties    10.1ST/Person/Hour    101 hours \*



**Theater Payoff - EDS-A = 40% fewer sortie equivalents, 4X the soldier productivity, 45% faster on the ground delivery**



**Supported by Army DCSLOG**

( \* 2,037 short tons of ammo for a Medium Brigade for 3 days)

# Insensitive Munitions Integration Program

- Insensitive Munitions Assessment of Army Munitions
- Less Sensitive Expulsion System for DPICM
- Bullet and Fragment Mitigation Technology
- Cycloid Containment for PAC-3 Missile Warhead
- Passive Venting Using a Low Temperature Additive
- Active Venting Technology- Thermoelectric Generator
- Active Venting Technology- Intermetallic Sensor/Igniter
- MLRS Grenade High Explosive Replacement
- 2.75" Rocket IM Vented Container
- IM/Green Tank Training Cartridge Propellant

- Leverages existing technology from:

- Other services
- Foreign
- Industry
- Tech base



- Improves munitions survivability
- Prevents fielding delays due to IM non-compliance



# Improved Munitions Packaging

- Large diameter, lightweight, low cost container
- Low cost training ammo packaging
- Special Ops unit packaging
- VCI free barrier bag
- Lightweight rectangular container
- IBCT dromedary box

- Reduced Life Cycle Cost:

- Reduced weight
- Reduced cube
- Longer shelf life
- Reduced cost

## FY00 Examples

- 5 Pending VEPs
- Potential **\$700K**/year annual savings if implemented on only  $\frac{1}{2}$  of future procurement



- Chosen for MPIM/SRAW Approx **\$150** less expensive per container
- **\$3M** estimated savings over program



Cheap Ammo Insurance 30 Years @ 1-2 % of Item Cost



**ASSIGNING  
RESPONSIBILITY  
TO MATERIAL  
HANDLING**



## Summary

- The path to Army Transformation demands:
  - A responsive ammunition logistics system
  - Reduced logistics footprint
- Technology we are developing today will help make this happen

***“The only thing that matters is Innovation.”***

Peter Drucker

## Contact Information

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**AMMO-LOG R&D Activity: Your “One Stop Shop” for Class V Logistics Improvements**